In the Claims:

1-54. (Canceled)

55. (Currently Amended) A reformer reactor for producing hydrogen-rich gas comprising:

a first zone for containing a reaction stream with reactants, said first zone comprising a partial oxidation reaction vessel having an opening for emission of the reactants into the first zone;

a collection space for collecting gaseous product;

at least one intermediate zone interposed between the first zone and the collection space, wherein at least the intermediate zone immediately adjacent to the first zone contains a catalyst suitable for promoting an endothermic reaction;

a partition separating the first zone from the zone immediately adjacent to the first zone, the partition having a plurality of spaced openings to permit the flow of a reactant stream therethrough; and

a means for directing the heated reactant stream in diverging directions from the first zone to the collection space primarily in the direction coinciding with the direction of a substantial portion of the overall heat flux out of the vessel; wherein the reactor is configured such that heat is transferred [from the partial oxidation vessel] to at least the zone immediately adjacent to the first zone so as to support a temperature promoting steam reforming in the presence of the catalyst.

56. (Original) The reformer reactor of Claim 55 having three zones interposed between the first zone and the collection space.

57.(Currently Amended) The reformer reactor of Claim 56 wherein [the three zones comprise] the second zone containing a suitable catalyst for catalyzing a steam reforming reaction in a reaction stream, the third zone containing a suitable catalyst for catalyzing a high-temperature shift reaction in a reaction stream, and the fourth zone containing a suitable catalyst for catalyzing a low-temperature shift reaction in a reaction stream.

58. (Canceled)

59. (Original) The reformer reactor of Claim 57 wherein all of the zones are arranged as nested coaxial cylinders and the vessel including sufficient thermal insulation at axial ends of the nested cylinders such that the heat flux, and accordingly the reaction stream flow, is primarily radially outward from the first zone to the collection space.

60. (Original) The reformer reactor of Claim 55 including a partial oxidation reactor located in the first zone for issuing a partially-oxidized hydrocarbon reactant mixture to the first zone.

61. (Original) The reformer reactor of Claim 59 including a partial oxidation reactor located in the first zone for issuing a partially-oxidized hydrocarbon reactant mixture to the first zone.

62. (Original) The reformer reactor of Claim 57 including a partial oxidation reactor located in the first zone for issuing a partially oxidized hydrocarbon reactant mixture to the first zone.

63. (Previously Presented) A reformer reactor for producing hydrogen-rich gas comprising:

a first zone for containing reactants, said first zone containing a partial oxidation reaction vessel having an opening for emission of reactants into the first zone;

at least one other zone within which the first zone is nested; wherein the zone adjacent to the first zone contains a first catalyst suitable for promoting an endothermic reaction such that heat is transferred to the first catalyst from either the reaction stream after the partial oxidation reaction or another zone in the reactor so as to support a temperature for promoting steam reforming in the presence of the first catalyst; and

a boundary between each pair of adjacent zones each said boundary being permeable to the reaction stream so as to permit flow thereof from the first zone to and through each subsequent zone through the respective boundaries therebetween, wherein said flow is in diverging directions from the first zone into at least one of the other zones in which the first zone is nested.

64.(Currently Amended) The reformer reactor of Claim 63 ~~having~~ [wherein the at least one other zone comprises] three nested zones around the first zone.

65. (Previously Presented) The reformer reactor of Claim 64 wherein the second zone contains a suitable catalyst for catalyzing a steam reforming reaction in the reaction stream, the third zone contains a suitable catalyst for catalyzing a high-temperature shift reaction in the reaction

stream, and the fourth zone contains a suitable catalyst for catalyzing a low-temperature shift reaction in the reaction stream.

66. (Canceled)

67. (Original) The reactor reformer of Claim 64 wherein the first zone is a cylinder and the three subsequent zones are tubular cylinders all nested coaxially and a closure is provided at axial ends of the cylindrical zones, such that the reaction stream flow is primarily outward from the third zone to and through the third zone.

68. (Original) The reformer reactor of Claim 63 including a partial oxidation reactor located in the first zone for issuing a partially-oxidized hydrocarbon reactant mixture to the first zone.

69. (Original) The reformer reactor of Claim 67 including a partial oxidation reactor located in the first zone for issuing a partially-oxidized hydrocarbon reactant mixture to the first zone.

70. (Original) The reformer reactor of Claim 65 including a partial oxidation reactor located in the first zone for issuing a partially-oxidized hydrocarbon reactant mixture to the first zone.

71. (Previously Presented) The reformer reactor of Claim 55 further comprising a supply of hydrocarbon reactant in fluid communication with the first zone.

72. (Currently Amended) The reformer reactor of Claim 55 wherein the ~~first~~ partition is constructed such that the material composition, thickness and finish of the partition assist in controlling heat transfer between the reaction vessel and the second zone.

73. (Currently Amended) The reformer reactor of Claim 55 wherein the ~~first~~ partition has openings, the number, size, and spacing of which are selected to control the flow rate and uniformity of the reaction stream from the first zone into the ~~second zone~~ [intermediate zone].

74. (Currently Amended) The reformer reactor of Claim 55 wherein the reactor is configured such that during operation, heat from the reaction stream after the partial oxidation reaction is transferred to the ~~first~~ catalyst in sufficient quantity to support a temperature promoting steam reforming in the presence of the ~~first~~ catalyst.

75. (Previously Presented) The reformer reactor of Claim 63 further comprising a supply of hydrocarbon reactant in fluid communication with the first zone.

76. (Currently Amended) The reformer reactor of Claim 63 wherein ~~the first partition~~ [a first boundary] is constructed such that the material composition, thickness and finish of the ~~partition~~ [first boundary] assist in controlling heat transfer between the ~~reaction vessel and the second zone~~ [between the first zone and the zone adjacent to the first zone].

77. (Currently Amended) The reformer of Claim 63 wherein ~~the first partition~~ [a first boundary] has openings, the number, size, and spacing of which are selected to control the flow rate and uniformity of the reaction stream from the first zone into the ~~second zone~~ [zone adjacent to the first zone].

78. (Previously Presented) The reformer reactor of Claim 63 wherein the reactor is configured such that during operation, heat from the reaction stream after partial oxidation reaction is transferred to the first catalyst in sufficient quantity to support a temperature promoting steam reforming in the presence of the first catalyst.

79. (Currently Amended) The reactor of Claim 55, wherein the at least one intermediate zone comprises a fourth zone adjacent ~~the~~ [a] third zone, [said third zone adjacent a second zone,] wherein in the reactor, the reaction stream flows into and through the third zone and the fourth zone in the same general directions as the reaction stream flowed into and through the second zone.

80. (Canceled)

81. (Canceled)

82. (Currently Amended) The reactor of Claim 55 wherein the first and ~~second~~ [intermediate] zones are generally cylindrical and the flow directions are radially away from the first zone.

83. (Canceled)

84. (Previously Presented) The reactor of Claim 57 wherein the first, second, third, and fourth zones are generally cylindrical and the flow directions are radially away from the first zone.

85. (Canceled)

86. (Previously Presented) The reactor of Claim 82 wherein the axial ends of each of the zones have a thermally insulating member.

87. (Currently Amended) The reactor of claim 55 wherein the ~~first~~ catalyst promotes a steam reforming reaction in the reaction stream.

88. (Currently Amended) The reactor of claim 79 wherein the ~~first~~ catalyst promotes a steam reforming reaction in the reaction stream; said reactor including a second catalyst in the third

zone, the second catalyst having a composition for promoting a high-temperature shift reaction in the reaction stream, and the fourth zone including a third catalyst having a composition for promoting a low-temperature shift reaction in the reaction stream.

89. (Currently Amended) The reactor of Claim 82 wherein the ~~first~~ catalyst promotes a steam reforming reaction in the reaction stream.

90. (Currently Amended) The reactor of Claim 82 wherein the ~~second~~ [intermediate] zone includes a suitable catalyst for catalyzing a steam reforming reaction in the reaction stream.

91. (Currently Amended) The reactor of Claim 84 wherein the ~~first~~ catalyst promotes a steam reforming reaction in the reaction stream, the third zone contains a suitable catalyst for catalyzing a high-temperature shift reaction in the reaction stream, and the fourth zone contains a suitable catalyst for catalyzing a low-temperature shift reaction in the reaction stream.

92. (Currently Amended) The reactor of Claim 55 wherein the ~~first~~ partition is a screen mesh.

93. (Canceled)

94. (Canceled)

95. (Canceled)

96. (Canceled)

97. (Currently Amended) The reactor of Claim 89 further comprising a means for heat exchange with a reactant feed stream having means for regulating the heat exchange so that a desired thermal gradient can be maintained in the catalyst of the ~~third~~ [intermediate] zone and the reaction stream temperature across the zone wherein the means for heat exchange is disposed.

98. (Previously Presented) The reactor of Claim 55 further comprising:

(a) means for flowing oxygen to the first zone;

(b) means for flowing a fuel to be oxidized to the first zone; and,

(c) means for cooperating the means for flowing oxygen and the means for flowing a fuel such that the flow of fuel assists the flow of oxygen.

99. (Previously Presented) The reactor of Claim 82 further comprising:

(a) means for flowing oxygen to the first zone;

(b) means for flowing a fuel to be oxidized to the first zone; and,

(c) means for cooperating the means for flowing oxygen and the means for flowing a fuel such that the flow of fuel assists the flow of oxygen.

100. (Previously Presented) The reactor of Claim 98 wherein the means for cooperating includes a fuel conduit for fuel flow and an oxygen conduit for oxygen flow, the fuel conduit being

joined to the oxygen conduit such the fuel flows at a higher velocity than the oxygen to assist in speeding the flow of oxygen in the oxygen conduit.

101. (Previously Presented) The reactor of Claim 98 further comprising a pressurized container for holding a gaseous hydrocarbon fuel.

102. (Previously Presented) The reactor of Claim 98 wherein the means for flowing oxygen includes a first tube, the means for flowing a fuel includes a second tube, and the means for cooperating includes a union of the first and second tubes such that a spray of fuel can issue from the second tube inside the first oxygen-carrying tube.

103. (Currently Amended) The reactor of Claim 63, ~~further comprising a fourth zone adjacent a third zone;~~ [wherein said zone adjacent to the first zone is a second zone, the reactor further includes a third zone adjacent said second zone and a fourth zone adjacent said third zone,] the flow path continuing a flow of the reaction stream into and through the third zone and the fourth zone in the same general directions as the reaction stream flowed into and through the second zone.

104. (Canceled)

105. (Canceled)

106. (Currently Amended) The reactor of Claim 63 wherein the first ~~and second zones~~ [zone and the zone adjacent to said first zone] are generally cylindrical and the flow directions are radially away from the first zone.

107. (Canceled)

108. (Previously Presented) The reactor of Claim 103 wherein the first, second, third, and fourth zones are generally cylindrical and the flow directions are radially away from the first zone.

109. (Canceled)

110. (Previously Presented) The reactor of Claim 106 wherein the axial ends of each of the zones have a thermally-insulating member.

111. (Previously Presented) The reactor of claim 63 wherein the first catalyst promotes a steam reforming reaction in the reaction stream.

112. (Previously Presented) The reactor of claim 103 wherein the first catalyst promotes a steam reforming reaction in the reaction stream; said reactor including a second catalyst in the third zone, the second catalyst having a composition for promoting a high-temperature shift reaction in the

reaction stream, and the fourth zone including a third catalyst having a composition for promoting a low-temperature shift reaction in the reaction stream.

113. (Previously Presented) The reactor of Claim 106 wherein the first catalyst promotes a steam reforming reaction in the reaction stream.

114. (Currently Amended) The reactor of Claim 106 wherein the ~~second~~ zone [adjacent to the first zone] includes a suitable catalyst for catalyzing a steam reforming reaction in the reaction stream.

115. (Previously Presented) The reactor of Claim 108 wherein the first catalyst promotes a steam reforming reaction in the reaction stream, the third zone contains a suitable catalyst for catalyzing a high-temperature shift reaction in the reaction stream, and the fourth zone contains a suitable catalyst for catalyzing a low-temperature shift reaction in the reaction stream.

116. (Currently Amended) The reactor of Claim ~~55~~ [63] wherein the ~~first partition~~ [boundary] is a screen mesh.

117. (Canceled)

118. (Canceled)

119. (Canceled)

120. (Canceled)

121. (Currently Amended) The reactor of Claim 103 further comprising a means for heat exchange with a reactant feed stream having means for regulating the heat exchange so that a desired thermal gradient can be maintained in ~~the catalyst of the~~ [a catalyst contained in a] third zone and the reaction stream temperature across the zone wherein the means for heat exchange is disposed.

122. (Previously Presented) The reactor of Claim 63 further comprising:

(a) means for flowing oxygen to the first zone;

(b) means for flowing a fuel to be oxidized to the first zone; and,

(c) means for cooperating the means for flowing oxygen and the means for flowing fuel such that the flow of fuel assists the flow of oxygen.

123. (Previously Presented) The reactor of Claim 108 further comprising:

(a) means for flowing oxygen to the first zone;

(b) means for flowing a fuel to be oxidized to the first zone; and,

(c) means for cooperating the means for flowing oxygen and the means for flowing a fuel such that the flow of fuel assists the flow of oxygen.

124. (Previously Presented) The reactor of Claim 122 wherein the means for cooperating includes a fuel conduit for fuel flow and an oxygen conduit for oxygen flow, the fuel conduit being

joined to the oxygen conduit such that the fuel flows at a higher velocity than the oxygen to assist in speeding the flow of oxygen in the oxygen conduit.

125. (Previously Presented) The reactor of Claim 113 further comprising a pressurized container for holding a gaseous hydrocarbon fuel.

126. (Currently Amended) The reactor of Claim ~~113~~ [123] wherein the means for flowing oxygen includes a first tube, the means for flowing a fuel includes a second tube, and the means for cooperating includes a union of the first and second tubes such that a spray of fuel can issue from the second tube inside the first oxygen-carrying tube.

127. (Previously Presented) The reformer reactor of Claim 55 wherein all the zones are arranged as nested coaxial cylinders in a vessel, said vessel including sufficient thermal insulation at its axial ends such that heat flux, and accordingly the reactant flow, is primarily radially outward from the first zone to the collection zone.

128. (Previously Presented) The reformer reactor of Claim 55 further comprising a partition between each of said intermediate zones.

129-132. (Canceled)